

Curriculum Vitae

Name: Raju Venugopalan.

Date of Birth: January 29, 1966.

Address: Nuclear Theory Group, Bldg. 510A
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Education: Ph.D. SUNY at Stony Brook, August 1992.
B.S. University of Chicago, June 1987.

Post-Doctoral Appointments:

- 1) Physicist with tenure, BNL, June 2002–present.
- 2) Physicist, Physics Department, BNL, Oct. 2001–June 2002.
- 3) RIKEN–BNL Center Fellow, October 2000–present.
- 4) Associate Physicist, Physics Department, BNL, Nov. 1999–Oct. 2001.
- 5) Assistant Physicist, Physics Department, BNL, Oct. 1998–Nov. 1999.
- 6) Research Asst. Professor and Danish Research Council Fellow,
Niels Bohr Institute, Denmark, January 1997 –October 1998.
- 7) Research Associate, National Institute for Nuclear Theory,
Univ. of Washington, September 1994–December 1996.
- 8) Research Associate, Theoretical Physics Institute,
University of Minnesota, September 1992–September 1994.

Visiting Scientist and other Research Appointments:

- 1) LBNL Berkeley, Aug. 28th–Sept. 8th, 2000.
- 2) MPI Munich, MPI–Heidelberg, & Univ. of Frankfurt, August 2000.
- 3) CERN + Saclay, summer 1999.
- 4) Ruhr Univ. Bochum, & Theory Group, Saclay, Oct.–Nov. 1997.
- 5) Niels Bohr Institute, June 1996.
- 6) CERN + BNL, May–June, 1995.
- 7) TFT, Helsinki, Sept.–Oct., 1993.
- 8) Leon Rosenfeld Fellow, Niels Bohr institute, summer 1990.
- 9) Student Fellow, Lawrence Berkeley Lab., summer 1989.

Honors: University of Chicago Undergraduate Scholarship, 1984–1987.

Publications in refereed journals and preprints

- 1) “Gluon production in the color glass condensate model of collisions of ultrarelativistic finite nuclei,” A. Krasnitz, Y. Nara and R. Venugopalan, arXiv:hep-ph/0209269.
- 2) “Elliptic flow of colored glass in high energy heavy ion collisions,” A. Krasnitz, Y. Nara and R. Venugopalan, arXiv:hep-ph/0204361 submitted to Phys. Lett.
- 3) “Classical computation of elliptic flow at large transverse momentum”, D. Teaney and R. Venugopalan, Phys. Lett. B539: 53 (2002).
- 4) “Anomalous chirality fluctuations in the initial stage of heavy ion collisions and parity odd bubbles”, D. Kharzeev, A. Krasnitz and R. Venugopalan, hep-ph/0109253, to appear in Phys. Lett. B.
- 5) “Generalized scaling of the transverse mass spectrum at the Relativistic Heavy-Ion Collider”, J. Schaffner-Bielich, D. Kharzeev, L. D. McLerran and R. Venugopalan, Nucl. Phys. A705: 494 (2002).
- 6) “Coherent gluon production in very high energy heavy ion collisions”, A. Krasnitz, Y. Nara and R. Venugopalan, *Phys. Rev. Lett.* **87**, 192302 (2001).
- 7) “Hard thermal loops and beyond in the finite temperature world-line formulation of QED”, R. Venugopalan and J. Wirstam, *Phys. Rev. D* **63**, 125022 (2001).
- 8) “From colored glass condensate to gluon plasma: Equilibration in high energy heavy ion collisions”, J. Bjorker and R. Venugopalan, *Phys. Rev. C* **63** 024609 (2001).
- 9) “The initial gluon multiplicity in heavy ion collisions”, A. Krasnitz and R. Venugopalan, *Phys. Rev. Lett.* **86** 1717 (2001).
- 10) “Wong’s equations and the small x effective action in QCD”, J. Jalilian-Marian, S. Jeon and R. Venugopalan, *Phys. Rev. D* **63** 036004 (2001).
- 11) “Minding one’s P’s and Q’s: From the one loop effective action in quantum field theory to classical transport theory,” J. Jalilian-Marian, S. Jeon, R. Venugopalan and J. Wirstam, *Phys. Rev. D* **62**, 045020 (2000).
- 12) “The initial energy density of gluons produced in very high energy nuclear collisions” A. Krasnitz and R. Venugopalan, *Phys. Rev. Lett.*, **84** (2000) 4309.

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- 13) “Non-perturbative computation of gluon mini-jet production in nuclear collisions at very high energies”, A. Krasnitz and R. Venugopalan, hep-ph/9809433, *Nucl. Phys.* **B557** (1999) 237.
- 14) “Fock space distributions, structure functions, higher twists and small x ”, by L. McLerran and R. Venugopalan, *Phys. Rev.* **D59** :094002 (1999)
- 15) “Boost covariant gluon distributions in large nuclei”, by L. McLerran and R. Venugopalan, *Phys. Lett.* **B424** (1998) 15.
- 16) “Hydrodynamical Description of 200 A GeV/c S+Au Collisions: Hadron and Electromagnetic Spectra”, by J. Sollfrank, P. Hoviinen, M. Kataja, P. V. Ruuskanen, M. Prakash and R. Venugopalan *Phys. Rev.* **C55** (1997) 392.
- 17) “Small x Parton Distributions and Initial Conditions for Ultrarelativistic Nuclear Collisions”, by R. Venugopalan, *Comments in Nuclear and Particle Physics*, vol.**22**, no.**3** (1997) 113.
- 18) “Lattice Computations of Small x Parton Distributions in a Model of Parton Densities in Very Large Nuclei”, by Rajiv Gavai and R. Venugopalan, *Phys. Rev.* **D54** (1996) 5795.
- 19) “Quantum Corrections to the Weizsäcker–Williams Gluon Distribution Function at small x ”, by A. Ayala, J. Jalilian–Marian, L. McLerran and R. Venugopalan, *Phys. Rev.* **D53** (1996) 458.
- 20) “The Gluon Propagator in non–Abelian Weizsäcker–Williams fields”, by A. Ayala, J. Jalilian–Marian, L. McLerran and R. Venugopalan, *Phys. Rev.* **D52** (1995) 2935.
- 21) “Nucleation of Quark–Gluon Plasma from Hadronic Matter” by J. Kapusta, A. Vischer and R. Venugopalan, *Phys. Rev.* **C51** (1995) 901.
- 22) “Green’s Functions in the Color Field of A Large Nucleus” by L. McLerran and R. Venugopalan, *Phys. Rev.* **D50** (1994) 2225 .
- 23) “Gluon Distribution Functions for Very Large Nuclei at Small Transverse Momentum” by L. McLerran and R. Venugopalan, *Phys. Rev.* **D49** (1994) 3352.
- 24) “Computing Quark and Gluon Distribution Functions for Very Large Nuclei”, by L. McLerran and R. Venugopalan, *Phys. Rev.* **D49** (1994) 2233.

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- 25) “Dynamical Growth Rate of a Diffuse Interface in First Order Phase Transitions”,
by R. Venugopalan and A. P. Vischer, *Phys. Rev.* **E49** (1994) 5849.
- 26) “Screening Mass from Chiral Perturbation Theory, Virial Expansion, and the Lattice”,
by V. L. Eletsky, J. I. Kapusta and R. Venugopalan, *Phys. Rev.* **D48** (1994) 4398.
- 27) “How fast is equilibration in hot hadronic matter?”, by Madappa Prakash,
Manju Prakash, R. Venugopalan and G. Welke, *Phys. Rev. Lett.* **70** (1993) 1228.
- 28) “Non-equilibrium properties of hadronic mixtures”, by Madappa Prakash,
Manju Prakash, R. Venugopalan and G. Welke, *Physics Reports* **227** (1993) 321.
- 29) “Thermodynamics of interacting hadrons at finite temperature”,
by R. Venugopalan and M. Prakash, *Nucl. Phys.* **A546** (1992) 718.
- 30) “A quantum mechanical model of color transparency”,
by J.-P. Blaizot, R. Venugopalan and M. Prakash, *Phys. Rev.* **D45** (1992) 814.
- 31) “The speed of sound in an interacting pion gas”,
by G. Welke, R. Venugopalan and M. Prakash, *Phys. Lett.* **B245** (1990)137.
- 32) “Anti-proton production as a baryonometer in ultrarelativistic heavy ion collisions”,
by S. Gavin, M. Gyulassy, M. Plümer and R. Venugopalan, *Phys. Lett.* **B234** (1990)175.
- 33) “Flow effects on transverse momentum spectra in ultrarelativistic nuclear collisions”,
by R. Venugopalan and M. Prakash, *Phys. Rev.* **C41** (1990) 221.

Publications in conference proceedings

- 34) “Elliptic flow from color glass condensate,”
by A. Krasnitz, Y. Nara, and R. Venugopalan, arXiv:hep-ph/0209341,
to appear in Proceedings of Quark Matter 2002.
- 35) “Probing a color glass condensate in high energy heavy ion collisions”,
by A. Krasnitz, Y. Nara and R. Venugopalan
in Proceedings of XXV RTFNB workshop, Sao Pedro, Brazil, Aug.31st-Sept.4th, 2002
to appear in the Brazilian J. of Physics.
- 36) “Recent progress in computing initial conditions for high energy heavy ion collisions”,
A. Krasnitz, Y. Nara, and R. Venugopalan, invited talk by R.V.,
in Proceedings of Statistical QCD Workshop, Bielefeld, Eds. F. Karsch and H. Satz,
August 2001, & in Proc. of ICPQCP 2001, Ed: M. Gonin, Paris, Sept. 2001.
- 37) “Small x physics and the initial conditions in heavy ion collisions”,
R. Venugopalan, hep-ph/0104168, plenary talk at Quark Matter 2001, Stony Brook, USA,
January 2001, Nucl. Phys. A **702**, 227 (2002).
- 38) “Multiparticle production at RHIC and LHC: A classical point of view”,
A. Krasnitz and R. Venugopalan, hep-ph/0102118, invited talk by A. K., published in
proceedings of *ISMD2000*, Tihany, Hungary, October 2000.
- 39) “Deeply inelastic scattering off nuclei at RHIC,”
R. Venugopalan, hep-ph/0102087, published in proceedings of
EPIC Workshop, MIT, Cambridge, September 2000.
- 40) “Solution of the Boltzmann equation for gluons after a heavy ion collision”,
J. Bjorker and R. Venugopalan, hep-ph/0011001, published in the proceedings of
International Workshop on Strong and Electroweak Matter, Marseille, June 2000.
- 41) “What’s new at small x”,
R. Venugopalan, Plenary talk at *6th Workshop in High Energy Physics Phenomenology*,
Chennai, India, January 2000. *Pramana* **55**, 73 (2000).
- 42) “Non-perturbative gluodynamics of high energy heavy-ion collisions”,
A. Krasnitz and R. Venugopalan, Invited talk by A. K at 5TH Workshop on QCD,
Villefranche-sur-Mer, France, Jan 2000, hep-ph/0004116.
- 43) “The first fermi in a high energy nuclear collision,”
A. Krasnitz and R. Venugopalan, Invited talk, *19th International Symposium
on Multiparticle Dynamics* (ISMD99), Providence, RI, 9-13 Aug. 1999, hep-ph/9910391.

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- 44) “Parton saturation, production, and equilibration in high energy nuclear collisions” invited talk, *34th Rencontres de Moriond*, hep-ph/9907209.
- 45) “Making glue in high energy nuclear collisions” invited talk, *8th Mexican School of Particles and Fields*, hep-ph/9905319.
- 46) “Real time simulations of nuclear collisions”, invited talk in proceedings of *3rd International workshop on continuous advances in QCD* Minneapolis, MN, April 16th–19th, 1998; hep-ph/9808332.
- 47) “On colliding ultrarelativistic nuclei on a transverse lattice”, invited talk in proceedings of *3rd International Conference on Physics and Astrophysics of Quark Gluon Plasma*, March 1997, World Scientific publishers.
- 48) “A model of large parton densities in pQCD”, invited talk in proceedings of Brookhaven HERA workshop, November 17th–18th, 1995.
- 49) “Wee Partons in Large Nuclei: from Virtual Dreams to Hard Reality”, plenary talk by R. Venugopalan, in Proceedings of *Quark Matter 95*, T 95–00–85, *Nucl. Phys.* **A590** (1995) 147c.
- 50) “Photons and Hadrons from Hydrodynamical Simulations of Ultrarelativistic Nuclear Collisions, P. Huovinen, M. Kataja, V. Ruuskanen, J. Sollfrank and R. Venugopalan, *Physics Days*, Finland, 1995.
- 51) “Parton distributions of large nuclei at small x”, invited talk by R. Venugopalan, in Proceedings of *Vth conference on the intersections of particle and nuclear physics*, St. Petersburg, FL, May 31st–June 6th, 1994.
- 52) “Parton distributions at small x”, invited talk by R. Venugopalan, in Proceedings of *Rencontres de Moriond*, Meribel, France, March 17th–24th, 1994.
- 53) “The color field of a large nucleus at small x” invited talk by R. Venugopalan, in *Minnesota workshop on continuous advances in QCD*, TPI-MINN–94–29, Ed. A. Smilga, World Scientific (1994).
- 54) “Coupling of Longitudinal and Transverse Flows in the Hydrodynamics of Ultrarelativistic Nuclear Collisions”, by R. Venugopalan, M. Prakash, M. Kataja and V. Ruuskanen, *Nucl. Phys.* **A566** (1994) 473c.

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- 55) “How fast is Equilibration in Hot Hadronic Matter”, by Madappa Prakash, Manju Prakash, R. Venugopalan and G. Welke, *Nucl. Phys.* **A566** (1994) 403c.
- 56) “How fast is Equilibration in Hot Hadronic Matter”, in Proceedings of *Interdisciplinary Workshop on Transport Phenomena*, Les Houches, February 1993.
- 57) “2+1-D hydrodynamics of secondaries in ultrarelativistic nuclear collisions”, by R. Venugopalan, M. Prakash, M. Kataja and V. Ruuskanen, in Proceedings of *VIIth winter workshop on nuclear dynamics*, World Scientific, Singapore, (1991).
- 58) “Hadrons off-equilibrium”, by Madappa Prakash, Manju Prakash, R. Venugopalan and G. Welke, in Proceedings of *VIIth winter workshop on nuclear dynamics*, World Scientific, Singapore, (1991).

Other publications

- 59) “White paper on the Electron-Ion Collider”, R. Holt et al., submitted to the Nuclear Science Advisory Committee, March 2001.

Lectures and Conference Organization

- 1) Organizer, RBRC summer workshop on “Current and Future directions at RHIC”, BNL, August 5th-22nd, 2002.
- 2) Lectures at Summer School on QCD theory and RHIC Physics, Shandong Univ., Jinan, China, June 2002.
- 3) Organizer, “Mini-symposium on topics in perturbative QCD”, BNL, May 2002.
- 4) Co-Chair, First EIC workshop, BNL, Feb. 28th-March 2nd, 2002.
- 5) Co-Convenor, “pA sub-group of the LHC Yellow Report”, Fall 2001-Fall 2002.
- 6) Lectures on “Initial conditions in heavy ion collisions”, Cargese Summer School in physics, August 2001.
- 7) Lectures on “Physics of Relativistic Nuclear Collisions”, D. Kharzeev, M. Prakash, J. Schaffner-Bielich, and R. Venugopalan, SUNY, Stony Brook, Fall 2000.
- 8) Co-Convenor with W. Ochs, “QCD in multi-particle production”, ISMD 2000, Lake Balaton, Hungary, October 9th–16th, 2000.
- 9) Co-organizer, eRHIC summer meeting, BNL, June 26th–July 14th, 2000, BNL Formal Report 52606, Ed. L. McLerran and R. Venugopalan.
- 10) Co-organizer, 2nd eRHIC workshop, Yale, April 6th–8th, 2000, BNL Formal Report 52592, Ed. L. McLerran, S. Peggs, R. Venugopalan, G. Garvey, V. Hughes, A. Deshpande, and J. Harris.
- 11) Co-organizer, 1st eRHIC workshop, BNL, Organizers: T. Ludlam, L. McLerran, G. Garvey, M. Strikman, and R. Venugopalan, December 3rd–4th, 2000.
- 12) Lectures at the XXXIX Cracow school of theoretical physics, Zakopane, Poland, *Acta Phys. Polon.* **B30** (1999) 3731, May 29th–June 8th, 1999.

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- 13) Co-organizer, RIKEN-BNL Center Workshop on
Hard parton physics in high energy nuclear collisions, March 1st-5th, 1999,
Organizers: J. Carroll, C. Gale, M. Tannenbaum, and R. Venugopalan.
- 14) Co-organizer, Workshop on *Coherent QCD processes with nucleons and nuclei*,
Organizers: L. L. Frankfurt, G. Piller, M. Sargsian, W. Weise, W. Krasny, M. Strikman
and R. Venugopalan, ECT*, Trento, August 31st - September 11th, 1998.
- 15) Lectures on *Light cone field theory and high energy scattering*,
at 11th Chris Engelbrecht summer school in theoretical physics
Cape Town, SA, February 4th-13th, 1998; nucl-th/9808023.
- 16) Lectures at “Jyvaskyla International Summer School”,
Jyvaskyla, Finland, August 1st-15th, 1997.
- 17) Co-organizer, 2nd INT/RHIC workshop on
Electromagnetic probes of the quark-gluon plasma,
J. Harris, R. Pisarski, R. Venugopalan and W. Zajc, Seattle, January 24th-27th, 1996.

Grants and Committees

- 1) Member, Physics Dept. Library Committee, October 2001-present.
- 2) Co-Principal Investigator, Program Development Fund from Brookhaven Science Associates, Feb. 2002-present.
- 3) Principal Investigator, LDRD grant from Brookhaven Science Associates, Oct. 1999-Oct. 2000; renewed Oct. 2000.
- 4) External member on CERN grants CERN/P/FIS/1203/1998, CERN/P/FIS/15196/1999, CERN/P/FIS/40108/2000, CERN/FIS/43717/2001.
- 5) Member and Chair, BNL Nucl. Theory/RIKEN & Nucl. Physics seminar committees, October 1999-October 2001.

Invited talks and seminars (since Fall 1998)

- 53) Invited talk, ECT* Workshop on Coherent Effects at RHIC and LHC, Trento, Italy, October 14th-19th, 2002.
- 52) Seminar, UERJ, Rio De Janeiro, Sept. 10th, 2002.
- 51) Seminar, Institute for Theoretical Physics, Univ. of Sao Paulo, Sao Paulo, Brazil, Sept. 5th, 2002.
- 50) Plenary talk, XXV Brazilian National Nuclear Physics Conference (RTFNB), Sao Pedro, Brazil, August 30th-Sept. 4th, 2002.
- 49) Invited talk, Conference on RHIC Physics, Wuhan, China, June 17th-18th, 2002.
- 48) Invited talk, STAR collaboration meeting, Berkeley, May 3rd-5th, 2002.
- 47) Invited talk, Workshop at ITP Santa Barbara, April 8th-12th, 2002.
- 46) Colloquium, Univ. of Illinois Chicago, March 2002.
- 45) Invited talk, *Workshop on future of lepton-hadron colliders*, Durham, UK, December 6th-7th, 2001.
- 44) Seminar, SUNY Stony Brook, November 15th, 2001.
- 43) Seminar, Univ. of Maryland, November 9th, 2001.
- 42) Seminar, Univ. of Virginia, November 7th, 2001.
- 41) Invited talk, *DNP meeting*, Hawaii, October 16th-20th, 2001.
- 40) Seminar, MIT, October 9th, 2001.
- 39) Invited talk, *International Conference on the physics of the Quark Gluon Plasma*, Ecole Polytechnique, France, September 3rd-7th, 2001.
- 38) Invited talk, *Statistical QCD*, Bielefeld, Germany, August 26th-30th, 2001.
- 37) Invited talk, *Gordon Conference on QCD at high T , high μ and small x* , Newport, July 22nd-27th, 2001.

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- 36) Invited talk, *ThermalFest*, BNL, July 20th-21st, 2001.
- 35) Seminar at McGill University, April 26th, 2001.
- 34) Seminar at Ohio State University, April 16th, 2001.
- 33) Colloquium at Iowa State University, April 9th, 2001.
- 32) Invited talk at Workshop on Lepton scattering, Hadrons, and QCD, March 26th-April 6th, 2001, Adelaide, Australia.
- 31) Plenary talk, *Quark Matter 2001*, Stony Brook, January 15th-19th, 2001.
- 30) Plenary talk at DNP meeting, Williamsburg, October 2000.
- 29) Plenary talk at EPIC workshop, MIT, September 14th–16th, 2000
- 28) Invited talk, LBNL summer workshop , August 31st, 2000.
- 27) Seminars at Munich, Heidelberg, and Frankfurt universities, August 1st-11th, 2000.
- 26) Invited talk, workshop on *QCD in a nuclear environment*, Regensburg, August 3rd-5th, 2000.
- 25) Invited talk, RBRC workshop on *Phase Transitions and Cosmology*, BNL, July 17th-28th, 2000.
- 24) Nuclear Theory Seminar at Argonne National Lab, May 18th, 2000.
- 23) Departmental Colloquium, BNL, April 18th, 2000.
- 22) Plenary talk, Yale eRHIC workshop, April 6th-8th, 2000.
- 21) Plenary talk, workshop on *High Energy Physics Phenomenology*, (WHEPP2000) Madras, India, January 4th–13th, 2000.
- 20) Invited talk, INT workshop on Non-equilibrium dynamics, Seattle, November 23rd, 1999.
- 19) RHIC primer series lecture, BNL, October 25th, 1999.
- 18) RIKEN lunch seminar, October 8th, 1999.
- 17) High Energy Seminar at Penn State Univ., September 28th, 1999.

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- 16) Invited talk at workshop on *RHIC computing*, September 2nd, 1999, BNL.
- 15) Invited talk, *International conference on Multiparticle Dynamics*, Brown Univ., August 9th–13th, 1999.
- 14) RHIC primer series lecture, BNL, July 26th, 1999.
- 13) Invited talk, RIKEN-BNL workshop on OSCAR, July 15th, 1999.
- 12) Invited talk, DESY workshop on eA physics, Hamburg, May 24th-26th, 1999.
- 11) RIKEN Lunch seminar, BNL, March 18th, 1999.
- 10) Triangle Colloquium, Duke Univ., April 6th, 1999.
- 9) Seminar, Univ. of Connecticut, February 23rd, 1999.
- 8) Colloquium, Ohio State University, February 8th, 1999.
- 7) Seminar, SUNY Stony Brook, January 1999.
- 6) Colloquium, Univ. of Illinois (Chicago), November 1998.
- 5) Invited talk, Recontres du Moriond, March 20th-27th, 1999.
- 4) Invited talk, III INT/RHIC winter workshop, LBNL, January 7th-9th, 1999.
- 3) Invited talk, VIII Mexican school of particles and fields, November 20th-28th, 1998.
- 2) Invited talk, RIKEN-BNL workshop on *In and out of Equilibrium*, October 26th-30th, 1998.
- 1) Seminar, MIT, October 1998.